

# Work Order ID 122794

July-28-14 8:23:40 AM

**\*122794\***

Page 1

Item ID: D212-664-101TRN

Accept

**\*N9000040100\***

Setup, Start

**\*NS1\***

Revision ID:

Item Name: Crosstube Turning Detail

Stop

**\*NS2\***

Start Date: 7/28/14 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 8/08/14 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan: *W*

Date:

Tooling:

Date:

Run

Start

**\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop

**\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr

Revision Nbr

D212-664-141

E

100:

0.00

**\*100\***

Mori Seiki

MORI SEIKI CNC LATHE LARGE

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA113

2-Turn first side as per Folio FA113

3-Blend transition lines only, \*\*do not sand whole tube\*\*:

FOLIO REV: *A*

DWG REV: *E*

\*Use mill bastard file, brush file repeatedly with file card.

\*Do not use sandpaper coarser than 320 grit.

110:

QC1: Inspect dimensions to dimension sheet

0.00

**\*110\***

QC

Memo

0.00

Quality Control

*mm2  
14/07/30*

*mm2  
14/07/30*

**Work Order ID 122794**

July-28-14 8:23:40 AM

**\*122794\***

Page 2

Item ID: D212-664-101TRN

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Turning Detail

Start Date: 7/28/14

Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 8/08/14

Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

120

0.00

**\*120\***

Mori Seiki

MORI SEIKI CNC LATHE LARGE

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA113

2-Blend transition lines only, \*\*do not sand whole tube\*\*:

\*Use mill bastard file, brush file repeatedly with file card.

\*Do not use sandpaper coarser than 320 grit.

FOLIO REV: ANDWG REV: E

3-Remove sand and plugs

130

QC1- Inspect dimensions to dimension sheet

0.00

**\*130\***

QC

Memo

0.00

Quality Control

+ PERFORM ULTRA SONIC MEASUREMENT

mmL  
14/07/30mmL  
14/07/30



# Work Order ID 122794

July-28-14 8:23:40 AM

**\*122794\***

Page 3

Item ID: D212-664-101TRN Accept **\*N900040100\*** Setup Start **\*NS1\***  
 Revision ID: Stop **\*NS2\***  
 Item Name: Crosstube Turning Detail  
 Start Date: 7/28/14 Start Qty: 1.00 **\*1\*** Cust Item ID:  
 Required Date: 8/08/14 Req'd Qty: 1.00 **\*1\*** Customer:  
 Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start **\*NR1\***  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
140	QC8- Inspect parts - second check	0.00							
<b>*140*</b>									
QC	Memo	0.00							
Quality Control	+ CHECK ULTRA SONIC MEASUREMENT AND ORIENTATION FOR BENDING								
145		0.00							
<b>*145*</b>									
Crosstubes	Memo	0.00							
Crosstubes	GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.								
150		0.00							
<b>*150*</b>									
HandFXtube	Memo	0.00							
Hand Finishing Crosstubes	1- PRESSURE WASH X-TUBE INSIDE AND OUT								
	2- ACID ETCH X-TUBE INSIDE AND OUT. USE RED SCOTCH BRITE								

*JW* 14-07-31

*DC* 14/07/31

*JW/DC* 14/07/31

# Work Order ID 122794

July-28-14 8:23:40 AM

**\*122794\***

Page 4

Item ID: D212-664-101TRN Accept **\*N900040100\*** Setup Start **\*NS1\***  
 Revision ID: Stop **\*NS2\***  
 Item Name: Crosstube Turning Detail  
 Start Date: 7/28/14 Start Qty: 1.00 **\*1\*** Cust Item ID:  
 Required Date: 8/08/14 Req'd Qty: 1.00 **\*1\*** Customer:  
 Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start **\*NR1\***  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID DAS	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
160 <b>*160*</b> QC Quality Control	QC5- Inspect part completeness to step on W/O  Memo	0.00 DAS 38 9-89 14/08/01	16 9-89 14/08/11			1			
170 <b>*170*</b> Packaging Packaging Packaging	Packaging  Memo Identify and Stock in kanban rack Location: <u>63</u>	0.00 0.00						14-08-01	
180 <b>*180*</b> QC Quality Control	QC21- Final Inspection - Work Order Release  Memo	0.00 0.00						14/8/11	

**14-8-1**

# Picklist Print

July-28-14 8:23:39 AM

Page 1

Work Order ID: 122794

**\*122794\***

Parent Item: D212-664-101TRN

**\*D212-664-101TRN\***

Parent Item Name: Crosstube Turning Detail

Start Date: 7/28/14

Required Date: 8/08/14

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:ec  
IPP Rev B 08.04.02 removed Polish EC verified by: DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6005-128		Manufactured	No			120	Each	89.0000	1	1			

**\*D6005-128\***

**\*\***

Crosstube Material

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
LG003	89	
107871	15	
75631	20	
75638	8	
75642	46	

1 mm 2 14/07/29

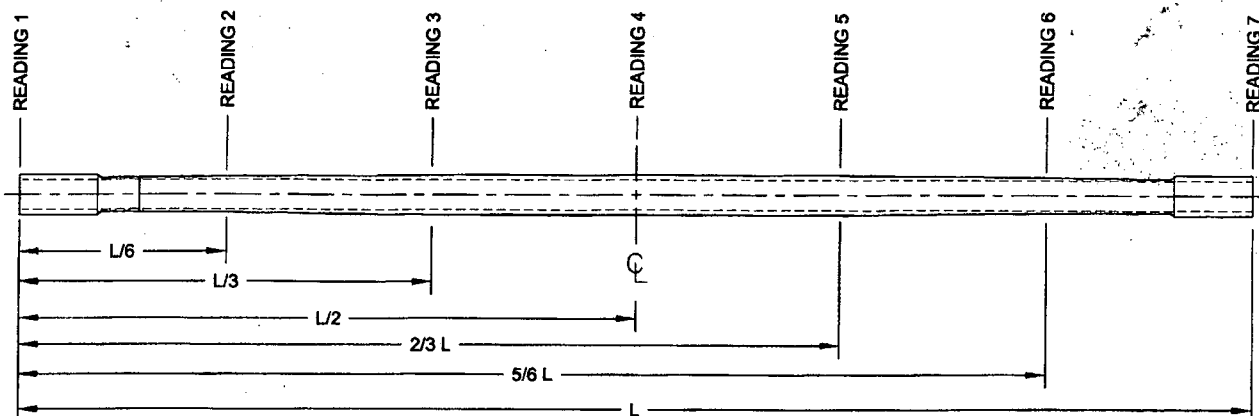
<b>DART AEROSPACE LTD</b>	<b>Work Order:</b> 122794
<b>Description:</b> Crosstube Assembly (205/212/412 High Fwd)	<b>Part Number:</b> D212-664-141
<b>Inspection Dwg:</b> D212-664-141 <b>Rev:</b> E	<b>Page 1 of 2</b>

### FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	0.200	+/-0.010	.200	/		vern	CNC-08
	R0.063	+/-0.010	.063	/		RG	
	2.740	+0.005/-0.000	2.740	/		vern	CNC-08
	5.097	+/-0.030	5.160	/			
	2.304	+0.005/-0.000	2.367	/			
	2.340	+0.005/-0.000	2.342	/			
	2.398	+0.005/-0.000	2.401	/			
	2.448	+0.005/-0.000	2.451	/			
	2.498	+0.005/-0.000	2.499	/			
	2.549	+0.005/-0.000	2.544	/			
	2.599	+0.005/-0.000	2.603	/			
	2.671	+0.005/-0.000	2.673	/			
	2.701	+0.005/-0.000	2.763	/			
SIDE B	0.200	+/-0.010	.200	/		vern	CNC-08
	R0.063	+/-0.010	.063	/		RG	
	2.740	+0.005/-0.000	2.741	/		vern	CNC-08
	5.097	+/-0.030	5.160	/			
	2.304	+0.005/-0.000	2.308	/			
	2.340	+0.005/-0.000	2.344	/			
	2.398	+0.005/-0.000	2.403	/			
	2.448	+0.005/-0.000	2.451	/			
	2.498	+0.005/-0.000	2.500	/			
	2.549	+0.005/-0.000	2.554	/			
	2.599	+0.005/-0.000	2.603	/			
	2.671	+0.005/-0.000	2.673	/			
	2.701	+0.005/-0.000	2.703	/			
	126.514	+/-0.020	126.500	/		type	L6-11

<b>DART AEROSPACE LTD</b>	<b>Work Order:</b> 122794
<b>Description:</b> Crosstube Assembly (205/212/412 High Fwd)	<b>Part Number:</b> D212-664-141
<b>Inspection Dwg:</b> D212-664-141 <b>Rev:</b> E	<b>Page 2 of 2</b>

### WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation $\Delta w$ (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	.372	.374	.382	.379	.010	0.048"
READING 2 L= 21	.236	.247	.244	.234	.017	
READING 3 L= 42	.343	.355	.359	.379	.036	
READING 4 L= 63	.374	.382	.385	.377	.011	
READING 5 L= 84	.346	.352	.361	.356	.015	
READING 6 L= 105	.232	.246	.247	.233	.015	
READING 7 L= 126.514	.362	.373	.389	.379	.027	

#### Calibration Result

Actual Block Thickness: 100 - 750

SITESCAN 250 Measured Thickness: 100 - 750

<b>Measured by:</b> <i>[Signature]</i>	<b>Audited by:</b> <i>[Signature]</i>	<b>Preliminary Approval:</b>
<b>Date:</b> 14/07/30	<b>Date:</b> 14.07.31	<b>Date:</b>

Rev	Date	Change	Revised by	Approved
C	07.05.28	Dwg Rev updated (P/O D412-664-101)	KJ/JLM	
D	10.02.02	Dimension 126.514 was 126.51	KJ	
E	12.06.04	Wall thickness form added	KJ	
F	14.06.05	Dwg Rev updated	KJ	<i>[Signature]</i>



Item	Qty -141	Qty -141B	Qty -141F	Part Number	Description
1	X			D212-664-141	CROSSTUBE ASSEMBLY (205/212/412 HIGH FWD)
2		X		D212-664-141B	CROSSTUBE ASSEMBLY (214 HIGH FWD)
3			X	D212-664-141F	CROSSTUBE ASSEMBLY (205/212/412 HIGH FWD) (ANODIZED)
4	1	1	1	D6005-128	CROSSTUBE
5	2		2	D2893-1	SUPPORT
6	4	4	4	D3595-063-450	RUBBER CUSHION
7		2		D5017-1	SUPPORT
8	4	4	4	MS21920-25	CLAMP (OR MS21920-26)
9	A/R	A/R	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

#### GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6005-128  
FINISHED LENGTH = 126.514±0.020
- FINISH -141 & -141B:
  - CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
  - PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
  - MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN C6-2 / C6-3, HATCHED AREA)
  - PAINT OUTSIDE PER DART QSI 005 4.2
  - REMOVE MASKING AND APPLY MATTE CLEAR COAT

- ANODIZE PER MIL-A-8625, TYPE II, CLASS 1.
- ALODINE (DO NOT ETCH) PER QSI 005 4.1.2
- PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
- MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN C6-2 / C6-3, HATCHED AREA)
- PAINT OUTSIDE PER DART QSI 005 4.2
- REMOVE MASKING AND APPLY MATTE CLEAR COAT

**\*NOTE:** BETWEEN FINISHING OPERATIONS EXTREME CARE MUST BE TAKEN NOT TO CONTAMINATE OR DAMAGE FINISHED SURFACES.

- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS
- WEIGHT: D212-664-141/-141B/-141F = 33.6 lbs
- PART IS SYMMETRIC ABOUT CENTERLINE.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.

#### MACHINING

- RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.

#### BENDING

- BEND PROGRESSIVELY WITH A MINIMUM OF 3 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 7.2% (BASED ON O.D.) IN LOWER HALF OF R35.5 BEND AND 6% (BASED ON O.D.) ON REMAINING TUBE.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.

#### ASSEMBLY

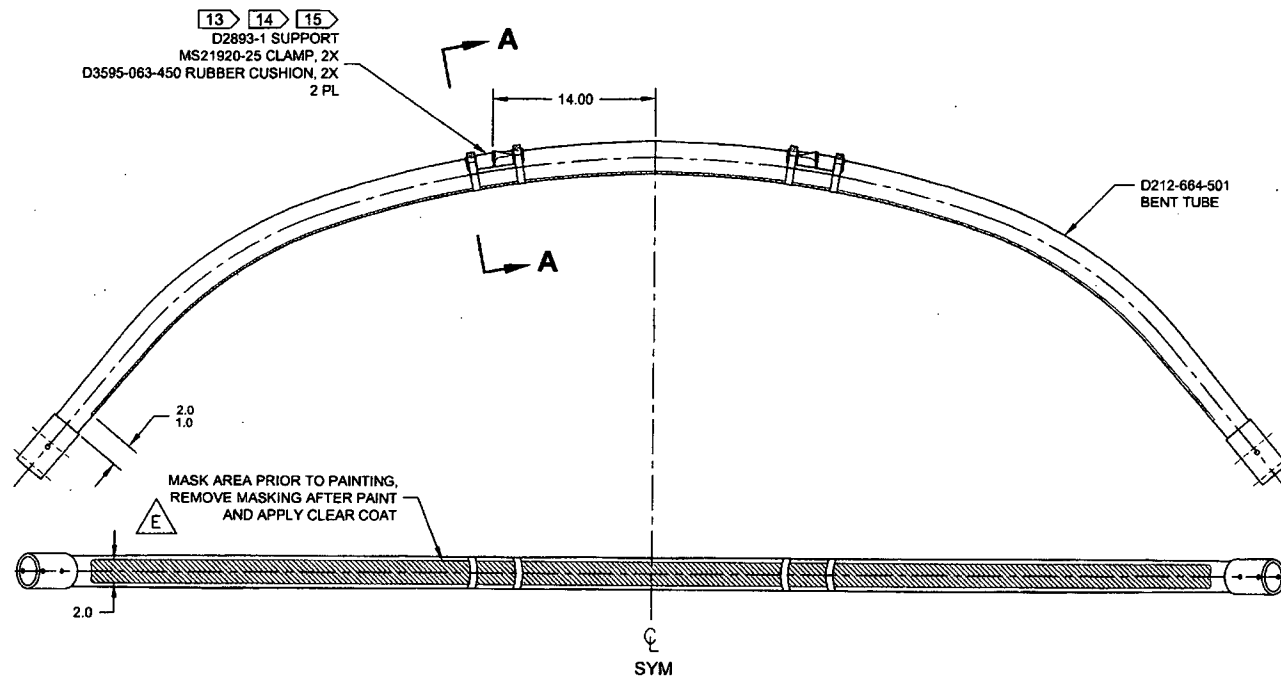
- TO INSTALL D2893-1 / D5017-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE THE SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE ON TOP SIDE OF CROSSTUBE.
- TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

*W/O  
122794*

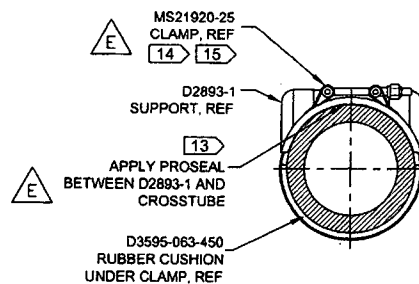
**RELEASED**  
2014-05-26  
*W/O*

E	ADD -141F, D5017-1 WAS D2893-1 (-141B), PROSEAL WAS MAGNOBOND, NOTE 2: ADD INSPECTION WINDOW, NOTE 11: ALLOW 7.2% CRUSH, NOTE 15: ADD 72HR CURE AND RETORQUE FOR PROSEAL, ADD SHEET 3, CLAMPS REVERSED TO PREVENT CHAFING (87-2, 87-3), BEND HEIGHT TOL. NOW 0.25 WAS 0.13 (C1-3), INCORP. DEO D-11-2/3	CP	14.04.01
D	REFORMAT/REVISE GENERAL NOTES/PART LIST; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; ADD -141B (ZN B4-2, D4-2); REMOVED REF & ADD TOLERANCES (ZN B4-3, C6-3, C8-3 & B6-3); RELOCATED FLAG #6 PER PAR 08-046 (ZN A5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4	RF	09.09.30
C	REMOVE -851 ABRASION STRIP; ADD MAGNOBOND 6398, CUSHION, REVERSE CLAMPS	PH	07.03.08
B	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	PH	05.02.04
A	NEW ISSUE	CP	00.12.12
REV.	DESCRIPTION	BY	DATE
DESIGN	<i>Q</i>		
DRAWN	<i>Q</i>		
CHECKED	<i>DW</i>		
MFG. APPR.	<i>JA</i>		
APPROVED	<i>JA</i>		
DE APPR.	<i>JA</i>		
DATE	14.04.01		

<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D212-664-141	REV. E SHEET 1 OF 5
TITLE XTUBE ASS'Y (205/212/412 HI FWD)	SCALE NTS
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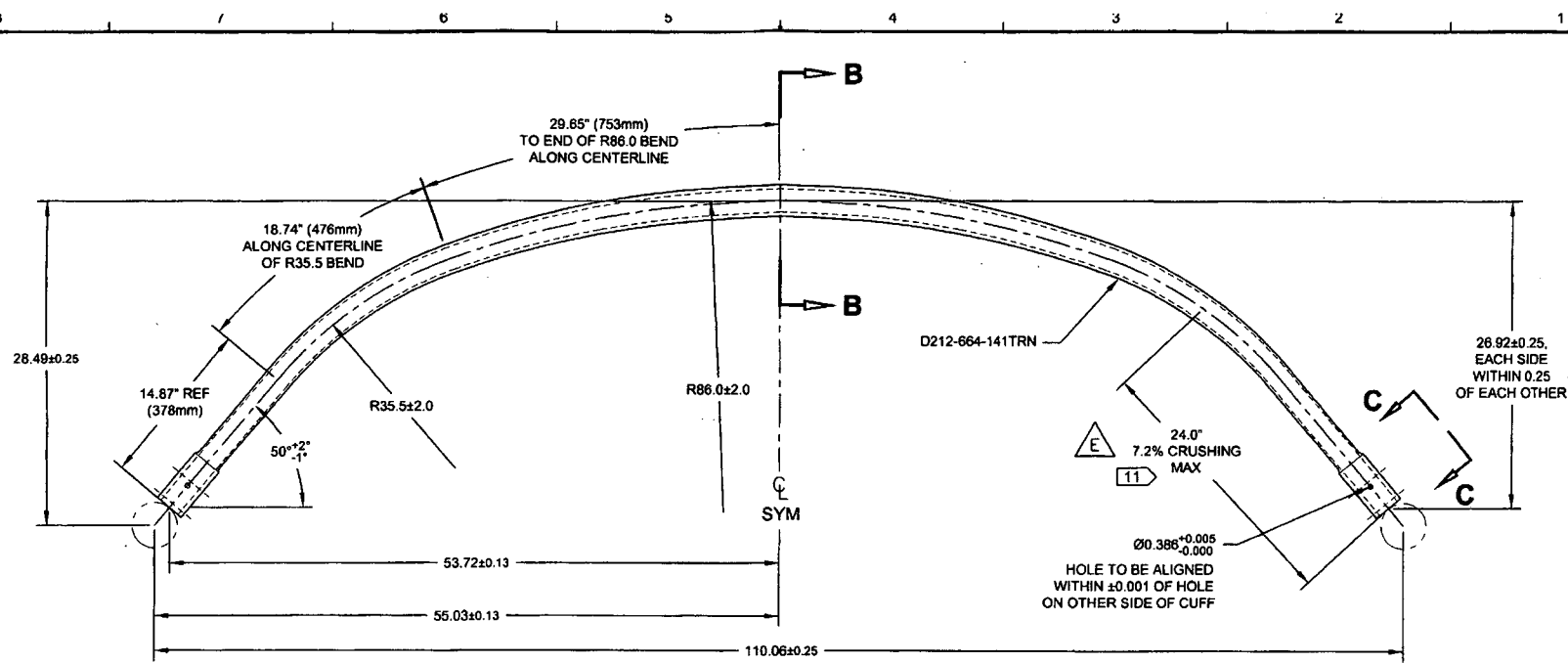
**D212-664-141F  
ASSEMBLY DETAIL**



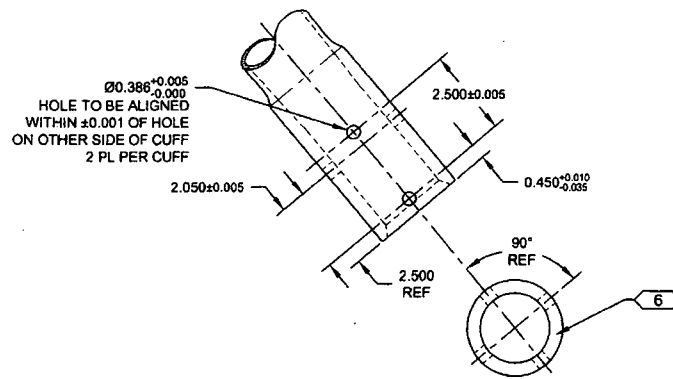
**SECTION A-A**  
SCALE 4X

**RELEASED**  
2014-05-26  
AND

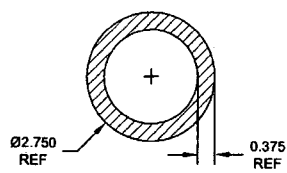
DESIGN	Q	<b>DART AEROSPACE LTD</b>	
DRAWN	Q	HAWKESBURY, ONTARIO, CANADA	
CHECKED	W	DRAWING NO.	REV. E
MFG. APPR.	W	D212-664-141	SHEET 2 OF 5
APPROVED	W	TITLE	SCALE
DE APPR.	W	XTUBE ASS'Y (205/212/412 HI FWD)	NTS
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**D212-664-501**  
**BENDING AND DRILLING DETAIL** [11]



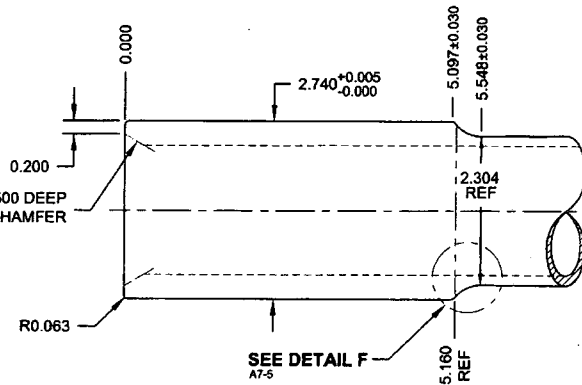
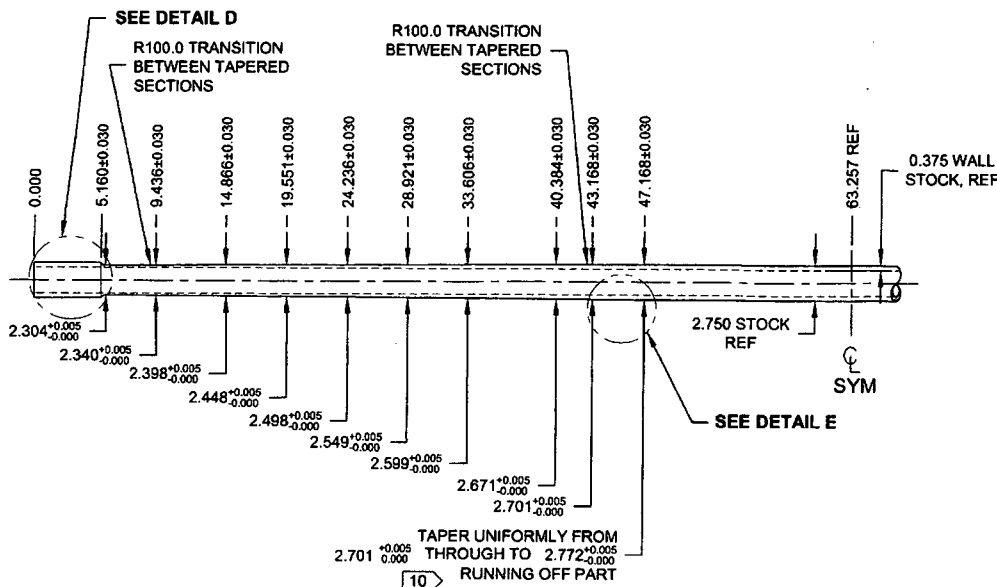
**VIEW C-C: CUFF DETAIL**  
 SCALE 3X



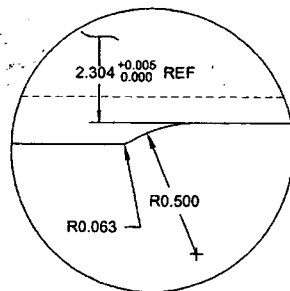
**SECTION B-B**  
 SCALE 4X

**RELEASED**  
 2014-05-26

DESIGN	<i>Q</i>	<b>DART AEROSPACE LTD</b>	
DRAWN	<i>Q</i>	HAWKESBURY, ONTARIO, CANADA	
CHECKED	<i>Q</i>	DRAWING NO.	REV. E
MFG. APPR.	<i>Q</i>	D212-664-141	SHEET 4 OF 5
APPROVED	<i>Q</i>	TITLE	SCALE
DE APPR.	<i>Q</i>	XTUBE ASSY (205/212/412 HI FWD)	NTS
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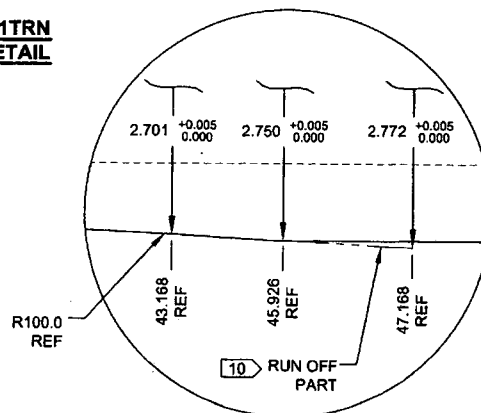


DETAIL D:  
CROSSTUBE CUFF  
SCALE 5X



DETAIL F:  
CUFF TRANSITION  
SCALE 10X

**D212-664-141TRN  
TURNING DETAIL**



DETAIL E:  
TAPER RUN-OFF  
NOT TO SCALE

RELEASED  
2014-05-26

DESIGN	92	<b>DART AEROSPACE LTD</b>	
DRAWN	92	HAWKESBURY, ONTARIO, CANADA	
CHECKED	92	DRAWING NO.	REV. E
MFG. APPR.	92	D212-664-141	SHEET 5 OF 5
APPROVED	92	TITLE	SCALE
DE APPR.	92	XTUBE ASS'Y (205/212/412 HI FWD)	NTS
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